Sculpting: An improved grid-based algorithm for all hexahedral meshing

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Grid-based algorithms provide the ability to generate all hexahedral meshes by introducing a structured mesh that bounds the complete body modeled, marking hexahedra to define an interior and exterior mesh, manipulating the boundary region between interior and exterior regions of the structured mesh to fit the specific boundary of the body, and finally, discarding the exterior hexahedra from the given body[1][2]. While such algorithms generally provide high quality meshes on the interior of the body, the boundary elements' quality usually suffers, having been distorted to fill voids along the boundary. The sculpting algorithm as presented here, addresses the difficulty in forming quality near boundary elements in two ways. The algorithm first finds more intelligent methods to define a structured mesh that conforms to the body to lessen large distortions to the boundary elements. Second, the algorithm uses collapsing templates to adjust the position of boundary elements to mimic the topology of the body prior to capturing the geometric boundary.

References

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